DEPARTMENT OF THE AIR FORCE **Entry Permit Authorization Letter 388-001**
388th FIGHTER WING (ACC)
388 CMS/MXMCF
Hill Air Force Base, Utah 84056

1 Mar 2003

LOCATION: 388th Component Maintenance Squadron, Fuel Systems Repair Section (Hangar 43) 7457 Canberra Drive. F-16 F-1 Fuel tank bladder cell maintenance will be performed at this location. Bioenvironmental Engineers completed annual survey on June 11, 2002.

1. **Description of Workplace:** The F-1 fuel tank bladder cell is a contoured flexible bag designed to contain fuel. The F-1 fuel tank bladder cell is located inside of the forward fuselage, upper surface, left side of the aircraft inside panel 2413 for the "C" model aircraft. It is located under panel 3432 and 3434 (aft side of forward fuselage) for the "D" model aircraft. Access door to confined space dimensions are: length-18 1/4" width-10 7/8". The F-1 Fuel tank bladder cell description is as follows:

Model	Fuselage Sta.	Fuel Capacity	Pounds	Length	Width	Height
F16C	235.0	296.5 Gals. (JP-8)	2016	4'6"	3'	3'6"
F16D	243.0	113.8 Gals. (JP-8)	774	est. 2'5"	3'	3'6"

2. **Tasks/Operations to be Performed:** All tasks referenced in the following table will be performed by Fuel System Repair Section personnel. Personnel on entry teams will be trained, and all entries will be made, in accordance with the requirements of T.O. 1-1-3 and AFOSH STD. 91-25.

Task	Directives/ Governing T.O.'s	Expected Levels/Last Baseline Survey Date	Respirator/ Personnel Protective Equipment
Purging/depuddling fuel tanks/cells	1F-16CG-3-1 1-1-3 AFOSH 91-25 & 48-1	JP8: Will be 10 percent or less of the Lower Explosive Limit (LEL) and oxygen will be between 19.5 and 23.5 percent. Annual Survey Date 11 June 2002.	3M Full Face SAR Chemical resistance, Gloves, Cotton Socks, Cotton Coveralls, Knee Pads And Hearing protection
Component replacement in fuel tanks/cells	(same as above)	(same as above)	(same as above)
Cleaning/sealing in fuel tanks/cells	(same as above)	(same as above)	(same as above)

3. **Chemicals Used:** See Attachment 1

4. **Technical Data Required:** See Paragraph 2

5. **Prevention of Unauthorized Entry:** The repair area will be roped off and signs posted during open tank maintenance to prevent unauthorized entry to the repair area. The Confined Space Field Permit will be posted at the job sight for the duration of the task and will show the exact conditions of the task being performed and all associated hazards. The entry supervisor or designated alternates will not authorize any entry not consistent with the conditions of this master plan.

6. **Potential Hazards:** Confined space entry hazards are: Inhalation, atmospheric, fire hazard, skin contact, ingestion, and eye.

6.1. **Potential Hazard Description:**

Hazard	Symptoms/Comments
Inhalation	Airborne benzene occupational exposure limits (OEL) is 0.5 parts per million (ppm) for 8 hour time weighted average or 2.5 ppm for 15 minute short term exposure limit (STEL). Prolonged inhalation may result in asphyxiation. Symptoms: respiratory tract irritation, dizziness, headache, fatigue, loss of consciousness, or death (use air line full face RPP)
Atmospheric	oxygen content less than 19.5% or greater than 23.5% parts per million (PPM)
Fire Hazard	Combustible atmosphere above 10% lower explosive limit (LEL)
Skin Contact	Irritation of the skin and may result in severe dermatitis (Use nitrile gloves & coveralls for protection)
Ingestion	Irritation of digestive tract, lung damage and possible death
Eye	Irritation, burning, redness, and tearing (air line full face RPP)
Entrapment	Clothing can become snagged preventing self-extraction

6.2. **Control of Hazards:** Personal Protective Equipment (see paragraph 10) will be used to prevent/limit exposure to the hazards listed in paragraph 6. Exhaust purge will be conducted prior to entry to remove fuel vapors and continuous ventilation will be conducted during tank entry. LEL and Oxygen levels will be tested /monitored IAW T.O. 1-1-3 (see paragraph 11 for testing procedures).

6.2.1. **Entry Permit:** Required. Permit will not be issued until confined space meets the requirements and acceptable entry conditions specified in paragraph 7.1 and 7.2. (See Attachment 3)

6.2.1.1. Confined Space Entry Permit will be used for F-16 aircraft F-1 fuel tank bladder cell maintenance. Permits will never be issued for more then the duration of the task.

6.2.1.2. F-16 aircraft, F-1 fuel tank bladder cell maintenance will be performed by personnel from the Fuel System Repair Section and other personnel qualified and authorized to enter this confined space.

6.2.1.3. A permit will be completed and signed prior to any entry into a confined space. The completed permit will be made available to all authorized entrants, by posting it at the entry portal or by any other equally effective means, so that entrants can confirm that pre-entry preparations have been completed. It remains the responsibility of each individual entrant to ensure that all required safety parameters are in place, prior to tank entry. Permit will be revoked and reaccomplished if any conditions have changed since the original permit was issued

7. **Entry Procedures:**

7.1 Isolation Methods: All aircraft will be made safe for maintenance prior to fuel maintenance. Hangar entry checklist (both fighter squadron and fuel section) will be completed to ensure all safety items have been complied with.

7.2. Acceptable Entry Conditions: Oxygen level content will be tested first, then atmosphere combustibility.

7.2.1. Purge the confined space using approved methods to rid the space of gases, vapors, or other airborne impurities. Confined space must have continuous fresh air ventilation while there is an entry.

7.2.2. Fuel tank entry can be made at 10% or less of the LEL with respiratory equipment for depuddling operations.

7.2.3. Oxygen and LEL (combustibility) level will be tested using the Bacharach, or equivalent, Combustible Gas & Oxygen Indicator. Oxygen level will be between 19.5 - 23.5 percent prior to tank entry.

7.2.4. PPM (toxicity) reading is not required for day-to-day operations, but is performed periodically by Bioenvironmental. Permissible exposure limit is less than 0.5 PPM (Benzene).

7.2.5. Perform fit test on respirator prior to entry.

7.2.6. Re-test the space for oxygen level content, and atmosphere combustibility every four hours or any time the conditions of the permit change. Oxygen level must be between 19.5 – 23.5 percent and 10% or less of the LEL prior to tank entry.

7.2.7. Perform the task if all safe entry conditions have been met.

7.2.8. When significant work interruptions occur and the operations and/or conditions are such that the judgment of any team member questions the safety conditions, the space will be tested again prior to re-entry.

7.3. When the task is completed, the entry field permit will be review and closed out by the section chief, and retained for one year.

8. **Authorization:** Only those personnel assigned to the confined space entry team and listed on the Field Permit will enter the confined space. They will be trained in confined space entry and certified to wear appropriate personal protective clothing and equipment as required by T.O. 1-1-3, paragraph 2-6.1 and 2-6-2, specifically a full face air line respirator (CAMS course code 490) and will be CPR (CAMS course code 464) qualified.

8.1. **Confined Space Entry Team:** The Entry Team will consist of the Entry Supervisor, Attendant, Entrant, and Spotter/Runner.

8.2. **Confined Space Entry Team Responsibilities:**

8.2.1. **Entry Supervisor:** The entry supervisor will ensure the following procedures are followed:

8.2.1.1. The designated entry supervisor will initiate, complete and authorize entry on the Confined Space Entry Permit.

8.2.1.2. The entry supervisor will contact MOC and the Base Fire Department prior to beginning maintenance and inform them that aircraft fuel systems personnel will be entering a confined space. The entry supervisor will ensure that the Base Fire Department is apprised of the location and type of aircraft that will be entered. Also, the entry supervisor will ensure that the Base Fire Department is available in case an emergency rescue is required. The name, phone number, aircraft location, and time that fire department was contacted will be entered on the Aircraft Hangering Checklist and in the Fire Department Notification log maintained at the dispatch desk.

8.2.1.3. All hazardous energy sources will be locked/tagged out by utilizing condition tags (AF Form 1492) before the confined space is entered.

8.2.1.4. The entry supervisor will ensure personnel with confined space and confine space rescue training monitors the LEL and oxygen content of the confined space to be entered prior to entry and every four hours after. The readings will be annotated on the confined space permit in the designated section.

8.2.1.5. Prior to performing atmospheric testing and issuing permit all required PPE/Monitoring Equipment will be inspected by the entry supervisor to ensure it is acceptable/serviceable for entry.

8.2.1.6. Entrant(s) will be briefed on specific hazards, work to be performed, control methods (e.g. lockout/tagout), and emergency egress before entry.

8.2.1.7. While the entrant is in the confined space, the attendant will stay in constant communication with the entrant until the task is completed.

Note: Visual/voice communication is the type of communication that will be used during aircraft fuel systems maintenance.

8.2.1.8. During this entire operation if the attendant, entry supervisor, or anyone else feels this operation is unsafe for any parties involved, they must stop the operation. The entry supervisor will be responsible to remedy whatever problems there are or seek help from applicable agencies to remedy the situation. The entry supervisor authorizes the permit for confined space work and plans each entry.

8.2.1.9. Ensures rescue capability exists for all shifts during which tank entry is accomplished. The size of the organizational rescue team must be sufficient to ensure that no unattended rescue activity occurs.

8.2.2 **Attendant:** The attendant will ensure the following procedures are followed:

8.2.2.1. Maintains continuous communication, visual and voice contact, with the entrant during the entry.

8.2.2.2. Reviews and signs the permit before entry.

8.2.2.3. Reviews the duties of the entrant and is familiar with procedures in case of emergency.

8.2.2.4. Makes sure the ventilation equipment is working (forced purge air and/or exhaust air).

8.2.2.5. Monitor atmospheric testing equipment.

8.2.2.6. Remains alert for early symptoms of danger within the space.

8.2.2.7. Watches for hazards outside of the space.

8.2.2.8. Notifies the entrant and orders evacuation if conditions warrant, or if the permit limits are violated.

8.2.2.9. Is prepared to call for emergency help if needed.

8.2.2.10. Remains at the entry point unless relieved by another trained attendant. If the primary entrant becomes incapacitated the attendant will become the entrant for rescue after being relieved of their attendant duties.

8.2.2.11. Any part of the attendant's body that breaks the plane of the confined space is considered to be an entry. The attendant must be careful not to break the plane passing tools, job guides, or materials to the entrant while in the confined space.

8.2.3. **Entrant:** The entrant will perform the following procedures:

8.2.3.1. Performs the assigned task.

8.2.3.2. Reviews and signs the entry permit prior to entry.

8.2.3.3. Uses and responds to appropriate monitoring equipment.

8.2.3.4. Stays aware of physical reactions that could signal an unsafe condition. If the entrant senses any reaction to the environment, the entrant will signal the attendant and leave the confined space immediately.

8.2.3.5. Responds to attendant's evacuation orders.

8.2.4. **Spotter/Runner:** The spotter/runner will perform the following procedures:

8.2.4.1. Monitors safe operation of equipment, procures supplies and equipment necessary for task completion. In case of emergency, notifies fire department, Maintenance Operations Center, shift supervisor, and assumes the duties of the attendant if designated as part of the rescue team.

8.2.4.2. Keeps unauthorized personnel out of the area.

8.2.4.3. Maintains clear access to and from the space.

6. **Training:** All authorized personnel who enter this confined space must be trained on confined space entry, site specific confined space entry, CPR/SABC, proper wear and use of PPE, retrieval/rescue equipment and atmospheric monitoring equipment.

9.1. Bioenvironmental Engineering or their designated representative annually trains fuel systems personnel in atmospheric monitoring for confined space entry.

9.2. Non-Fuel Systems personnel entrants/ attendants/runners (Structural Repair, Metals Technology, Non-Destructive Inspection, Guidance and Control, etc.) require annual confined space training conducted by fuel shop entry supervisors or designated alternates listed in ATTACHMENT 1. As a minimum, local training shall cover site specific confined space training, tank familiarization, safety equipment, grounding, bonding, purging procedures, depuddling, operations, using respirators, recognizing symptoms of toxicity from fuel and solvent vapors, and rescue/emergency procedures. **Non fuel system repair personal with out confined space and confined space rescue training will not be utilized at part of the rescue team.**

Prior to allowing non-fuel systems personnel into the aircraft fuel tank, the entry authority/supervisor will verify personnel have received Fuel Systems Safety Training and the date of training does not exceeded 1 year. (Verification of training can be made through the Core Automated Maintenance Systems (CAMS). Fuel Cell Maintenance/Safety Training is currently course code 46.)

9.3 Emergency rescue training will be conducted annually for all fuel systems personnel and Documented on AF Form 55.

9.3.1. All personnel will require retraining if:

9.3.1.1. The employee shows a repeated disregard for confined space entry or atmospheric monitoring procedures.

9.3.1.2. Wing Safety, Bioenvironmental Engineering, and the Base Fire Department in Conjunction with the Squadron Commander believes there are inadequacies in the employees' knowledge of confined space entry procedures.

9.3.2. Aircraft Fuel Systems personnel who enter confined spaces will receive site specific confined space training. Training will be conducted annually utilizing the MEP as the training outline. Whenever this MEP changes, all personnel will be retrained on the requirements of this MEP.

9.3.3. Training can be documented on work center rosters or Core Automated Maintenance System (CAMS).

10. **Entry Equipment:** The following table identifies personal protective equipment that is commonly used in confined space entries. All personnel that enter and work within aircraft fuel systems confined spaces will use the personal protective equipment in accordance with the tasks specified.

TYPE OF PPE	WORK TASK
Cotton Coveralls/ Gortex Coveralls	During all bladder cell maintenance
3M model 7800 Supplied air full face respirator	F-16CG aircraft: after initial tank opening and personnel's face must enter tank for maintenance, whenever chemicals are introduced and bladder cell maintenance
Goggles	When opening aircraft (listed in section 1) fuel tanks. Goggles or a face shield is also required when handling any chemicals, exposed to fuel and sealants. Goggles are not required if the individual is wearing a full-face supplied air respirator.
Hearing Protection, Muffs or plugs	Only needs to be worn when using power and air tools.

Chemical Protective Gloves, *Nitrile*	When handling any chemicals, exposed to fuel and sealants.
Face shield	When opening aircraft (listed in Section 1) fuel tanks. Goggles or a face shield are also required when handling any chemicals, exposed to fuel and sealants. A Face shield is not required if the individual is wearing a full-face supplied air respirator.

11. **Testing:** The Bacharach Model 514 Sniffer is used to monitor the interior atmospheric conditions of the confined spaces listed in paragraph 1. The Bacharach Model 514 Sniffer is the only item requiring calibration by TMDE. The calibration interval is every 180 days. The other items do not require calibration. All testers are maintained in the aircraft fuel systems support section and will be signed out for use following established AFI/ACCI/WI/and shop policies for consolidated tool kit (CTK) procedures. The Bacharach Model 514 Sniffer will be signed out at job start and kept readily available at the job site until the confined space is closed. Monitoring will be in accordance with T.O. 1-1-3 for applicable application.

11.1. The personal trained on confined space and confined space rescue will conduct atmospheric monitoring as follows:

11.1.1. LEL and oxygen level checks will be made prior to tank entry, at the beginning of each shift, and every four hours or anytime a new chemical **(must be listed on MEP)** is introduced to the environment IAW T.O. 1-1-3. Readings will be documented on the Field Permit. An atmospheric reading will be accomplished prior to reentering the confined space after breaks, lunches etc.

11.1.1. The designated monitor will turn on the monitoring device and let it warm up in a clean air source away from the confined space.

11.1.2. Testing will be conducted in accordance with Technical Order 1-1-3, applicable Bacharach 514 sniffer instructions, and Dragger pump instructions.

11.1.3. The personal trained on confined space and confined space rescue will conduct monitoring in accordance with T.O. 1-1-3 of the inside of the space for the following in the order that they appear.

11.1.4.1. Oxygen: Prior to any entry, the designated monitor listed above must ensure the oxygen content is between 19.5% and 23.5%. This will be accomplished by monitoring all levels of the confined space from top to bottom as soon as the space is opened. The monitor will ensure no one enters the confined space if the oxygen is not between 19.5% - 23.5%.

11.1.4.2. Lower Explosive Limit (LEL): After the oxygen is checked, the designated monitor listed above will ensure the meter reading is 10% or less of the LEL. If the LEL level is higher than 10%, the tank must continue to be purged before confined space entry is allowed.

11.1.4.3. Carbon Monoxide: Not required. Carbon Monoxide could be present if an engine was running in a confined space or close to the opening of a confined space, or welding, cutting, and brazing operations were being performed in the confined space. None of these operations will be performed without an AF Form 592 , USAF Welding, Cutting and Brazing Permit issued by the installation fire department.

11.1.5. Confined space entrants will be provided an opportunity to observe any testing of the space that is conducted prior to entry or subsequent to such entry. This option ensures that confined space permit entrants, whose work could require entry into potentially life-threatening atmospheres, have the information necessary to protect themselves and their co-workers from confined space hazards.

12. **Communication and Observation:**

12.1. **Method:** Visual Observation.

12.2. **Equipment:** None required for this confined space.

12.3. **Procedures to notify emergency rescue services:** When an emergency is declared, the spotter/runner will notify the appropriate emergency rescue services by phone using 911 or 777-1911 from a cell phone for on base rescue and/or by radio.

Warning- Cell phones when used; must be kept a minimum of 50 feet from the repair area!

12. **Rescue:** The confined space rescue team will be composed of two Fuel System qualified personnel, usually the attendant and runner/equipment monitor. They are the initial responders in the event of an emergency and will comply with the following **EMERGENCY RESPONSE PLAN** procedures.

13.1. **EMERGENCY RESPONSE PLAN:**

13.1.1. The Emergency Response Plan is intended to provide rescue procedures for an individual incapable of self-rescue from a fuel tank.

13.1.2. In the event the entrant should become incapacitated inside a confined space, the attendant will alert the runner/equipment monitor that an emergency has taken place.

13.1.3. The attendant will ensure the confined space is being properly ventilated by using the forced air duct. Determine through contact with the entrant, if possible, the nature of the emergency, assess the conditions of the tank, ensure air flow through the respirators, and make any rescue attempts possible from outside the tank. The attendant will not enter the tank until the runner/equipment monitor is in place to assume the attendant's duties and the runner must be qualified.

13.1.4. The runner will notify dispatch of the emergency and dial 911 or 777-1911 using a cell phone, contact the Maintenance Operations Center and supply the following information:

Warning- Cell phones when used; must be kept a minimum of 50 feet from the repair area!

13.1.4.1. Name of Caller
13.1.4.2. Name of Shop
13.1.4.3. Name of Entrant
13.1.4.4. Nature of Emergency
13.1.4.5. Building Number or Exact Location

13.1.5. After completing notifications, the runner or qualified individual appointed by entry supervisor will immediately return to the site and assume the responsibilities of the attendant prior to entry (if qualified to do so).

13.1.6. **All other fuel systems maintenance will cease.** All available personnel will aid the dispatcher in opening the aircraft maintenance bay doors to provide access to emergency response personnel.

13.1.7. If tank entry is required to aid rescue, proceed when the runner/equipment monitor, (now the attendant) is in place. The attendant, (now the rescuer) will don a full-face air supplied respirator, enter the tank with an additional full-face air supplied respirator to rescue the entrant.

13.1.8. The attendant will check the entrant for breathing, switch the additional respirator with the existing respirator, if required, on the entrant and remove him/her from the tank by the most direct route.

13.1.9. The runner/equipment monitor will assist the attendant and entrant, if needed, as they exit the tank, retrieving air hoses or equipment that may be in the way.

13.1.10. If removal of entrant fails or is not possible wait for the fire department to arrive. Monitor entrant closely while waiting.

13.1.11. After the entrant has been removed from the tank, the attendant and runner/equipment monitor will move the entrant to a safe well-ventilated area.

13.1.12. Until medical agencies respond, CPR, mouth-to-mouth resuscitation, and or Self-Aid/Buddy Care will be given to the entrant, as required.

14. **Contractor Interface:** N/A

15. **Permit Routing and Control:** Completed Field Permits will be filed for a period of one year.

16. **Amendment to the MEP:** Changes/amendments to the MEP other than for spelling/ grammar must be coordinated with 388th FW/SEG, 00-ALC/SEG, CEF, BES. Annual review of the MEP will be performed by the entry supervisor and coordinated agencies listed in paragraph 18 of the MEP.

Confined space entry permits not consistent with this Master Entry Plan will be issued without prior approval from the Wing Safety Office, Base Safety Office, Bioenvironmental Engineering Flight, and the Base Fire Department. After receiving approval, routine and recurring tasks may be added to this plan on attached sheets. Wing Safety, Base Safety, Bioenvironmental Engineering, and the Base Fire Department must review these tasks.

17. **If deployed or TDY**, use the established Master Entry Permit at the location of which confined space and confine space rescue trained personnel are assigned.

18. **Coordination:**

388th CMS Fuel Systems Section Chief	Date
388th FW/SEG	Date
00-ALC/SEG	Date
Bioenvironmental Engineering/SGPB	Date
Fire Department/CEF	Date
388th Logistics Group Commander	Date

ATTACHMENTS

1. Confined Space Entry Authorization List
2. Confined Space Chemical Listing
3. Field Permit